

FINAL REPORT
APRIL 1998

REPORT NO. 98-07

M118 DEMOLITION CHARGE IN WIREBOUND WOODEN BOX UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS

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Prepared for:
U.S. Army Armament Research, Development
and Engineering Center
ATTN: AMSTA-AR-ESK
Rock Island, IL 61299-7300

VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639



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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV) was tasked by U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) tests on the package of M118 demolition charges in a wirebound wooden box, for compliance with UN POP requirements. The M118 demolition charges in a wirebound wooden box met all UN POP test requirements.					
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22a. NAME OF RESPONSIBLE INDIVIDUAL JEROME H. KROHN			22b. TELEPHONE (Include Area Code) 815-273-8929		22c. OFFICE SYMBOL SIOAC-DEV

U.S. ARMY DEFENSE AMMUNITION CENTER
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 98-07

M118 DEMOLITION CHARGE IN WIREBOUND WOODEN BOX
UNITED NATIONS (UN) PERFORMANCE ORIENTED PACKAGING (POP) TESTS

TABLE OF CONTENTS

PART	PAGE NO.
1. INTRODUCTION.....	1-1
A. BACKGROUND	1-1
B. AUTHORITY	1-1
C. OBJECTIVE	1-1
D. CONCLUSION.....	1-1
2. ATTENDEES.....	2-1
3. TEST PROCEDURES	3-1
4. UN POP TESTS	4-1
5. HAZARD CLASSIFICATION.....	5-1
6. PHOTOGRAPH.....	6-1
7. DRAWING	7-1

PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SIOAC-DEV), was tasked by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct United Nations (UN) Performance Oriented Packaging (POP) on the package of M118 demolition charges in a wirebound wooden box, for compliance with UN POP requirements.

B. AUTHORITY. This program was conducted IAW mission responsibilities delegated by the U.S. Army Material Command (AMC), Logistics Support Activity Packaging, Storage, and Containerization Center (LOGSAPSCC). Effective 9 July 1993, the three letter designator "DEV" was assigned for use when conducting UN POP tests. Effective 9 August 1994 this designation was included in the Joint Regulation AR 700-143, Performance Oriented Packaging of Hazardous Materials.

C. OBJECTIVE. To determine if this item meets UN POP requirements.

D. CONCLUSION. As tested, the wooden wirebound box for the M118 demolition charge met all UN POP requirements with no problems encountered during testing.

PART 2

APRIL 1998

ATTENDEES

Bradley J. Haas
Mechanical Engineer
DSN 585-8989
815-273-8989

Director
U.S. Army Defense Ammunition Center
ATTN: SIOAC-DEV
3700 Army Depot Road
Savanna, IL 61074-9639

PART 3

TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from the Bureau of Explosives (BOE) Tariff No. BOE-6000-L, Subpart M, Section 178.600. All tests were conducted to Packing Group II requirements.

A. **Drop Test.** Each package will be dropped onto a nonyielding surface from the height and orientations listed below. The drop height is measured as the vertical distance from the target to the lowest point on the package. The drop height for Packing Group I is 1.8 meters (5.9 feet), for Packing Group II it is 1.2 meters (3.9 feet), and Packing Group III is 0.8 meters (2.6 feet).

Packaging	No. of tests	Drop orientation of samples
Steel drums, Aluminum drums, Metal drums (other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and jerricans, Composite packagings which are in the shape of a drum.	Six — (three for each drop) . . .	First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on the circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box.	Five — (one for each drop) . . .	First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).
Bags — single-ply with a side seam.	Three — (three drops per bag) .	First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).
Bags — single-ply without a side seam, or multi-ply	Three — (three drops per bag) .	First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).

B. **Stacking Test.** The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 meters (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 degrees Celsius (104 degrees Fahrenheit). Alternative test methods which yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

C. **Vibration Test.** Three sample packagings, selected at random, must be filled and closed as for shipment. The three samples must be placed on a vibrating platform that has a vertical or

PART 4

UN POP TESTS

M118 Demolition Charge in Wirebound Wooden Box

U.S. Army Defense Ammunition Center
SIOAC-DEV, Savanna, IL 61074-9639
815-273-8908
Jerome H. Krohn

Test Report Number: 98-07	Service Code: DEV
Product NSN: 1375-00-728-5941	Nomenclature: Charge, Demolition, M118
DODIC: M024	
Shipping Name: Charge, Demolition	
Hazard Class: 1.1	Packing Group: II
Physical State: Solid	NALC/DODAC: None
CAA Number: None	EX Number: None
CFR 49 Packaging Method: Part 173.62, Packing Group II, Method E-117	
Net Explosive Weight: 18.18 kgs (40 lbs)	

DESCRIPTION OF PACKAGINGS TO BE TESTED

EXTERIOR CONTAINER

Exterior Container: Wirebound Wooden Box

CFR 49 Reference Number: Part 173.62, Packing Group II, Method E-117

UN Code: UN 0048

Specifications: MIL-B-46506, Grade A, Drawing Number: 8876128
Type II, Class 1

Net Quantity Weight: 24.3 kg (53.4 lbs)

Tested Gross Weight: 28.4 kg (62.6 lbs)

Dimensions Interior: L-15-5/16" X W-12-1/2" X H-6-3/8"

Manufacturer: Great American Wirebound, Fernwood, MS

Year Container Manufactured: 1997

Drawing Number(s): N/A

Cushioning: Fiberboard fillers as required.

Closure: 4 wire hoops on side of container are brought through the 4 wire loops on the lid,
then folded over.

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: Plastic bag

Unit Container Specification: N/A

Unit Container NSN: N/A

Unit Container Cushioning: None

Unit Container Closure Method: Sealing clip and heat shrink bag

Unit Container Dimensions: L-12-1/2" X W-3-1/4" X H-1-1/4"

Number of Charges Per Unit Container: 4

Number of Charges Per Box: 20

SPECIAL NOTES

All exterior, and unit containers must be inspected prior to use. Inspect for physical damage and structural integrity of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: Military or DOD licensed truck and rail.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Pressure Applied: N/A

TEST PROCEDURES

<u>Tests Conducted</u>	<u>Test Method</u>	<u>Test Results</u>
(1) Pre-Conditioning (fiberboard)	Part 178.602	N/A
(2) Drop Test	Part 178.603(e)(1)(ii)	Pass
(3) Leakproofness Test	Part 178.604	N/A
(4) Hydrostatic Pressure Test	Part 178.605	N/A
(5) Stacking Test (1,000 lbs)	Part 178.606(c)(1)	Pass
(6) Vibration Test	Part 178.608(b)(3)	Pass

rotary double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

D. Pass/Fail Criteria. A package passes the above tests if there is no rupture or leakage from any of the samples. No test sample should show any deformation which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

UN POP TESTS

U.S. Army Defense Ammunition Center
SIOAC-DEV, Savanna, IL 61074-9639
815-273-8908
Jerome H. Krohn

Test Report Number: 98-07	Service Code: DEV
Product NSN: 1375-00-728-5941	Nomenclature: Charge, Demolition, M118
DODIC: M024	
Shipping Name: Charge, Demolition	
Hazard Class: 1.1	Packing Group: II
Physical State: Solid	NALC/DODAC: None
CAA Number: None	EX Number: None
CFR 49 Packaging Method: Part 173.62, Packing Group II, Method E-117	
Net Explosive Weight: 18.18 kgs (40 lbs)	

EXTERIOR CONTAINER

4-1

Tested Gross Weight: 28.4 kg (62.6 lbs)

Dimensions Interior: L-15-5/16" X W-12-1/2" X H-6-3/8"

Manufacturer: Great American Wirebound, Fernwood, MS

Year Container Manufactured: 1997

Drawing Number(s): N/A

Cushioning: Fiberboard fillers as required.

Closure: 4 wire hoops on side of container are brought through the 4 wire loops on the lid,
then folded over.

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: Plastic bag

Unit Container Specification: N/A

Unit Container NSN: N/A

Unit Container Cushioning: None

Unit Container Closure Method: Sealing clip and heat shrink bag

Unit Container Dimensions: L-12-1/2" X W-3-1/4" X H-1-1/4"

Number of Charges Per Unit Container: 4

Number of Charges Per Box: 20

SPECIAL NOTES

All exterior, and unit containers must be inspected prior to use. Inspect for physical damage and structural integrity of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: Military or DOD licensed truck and rail.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Pressure Applied: N/A

TEST PROCEDURES

<u>Tests Conducted</u>	<u>Test Method</u>	<u>Test Results</u>
(1) Pre-Conditioning (fiberboard)	Part 178.602	N/A
(2) Drop Test	Part 178.603(e)(1)(ii)	Pass
(3) Leakproofness Test	Part 178.604	N/A
(4) Hydrostatic Pressure Test	Part 178.605	N/A
(5) Stacking Test (1,000 lbs)	Part 178.606(c)(1)	Pass
(6) Vibration Test	Part 178.608(b)(3)	Pass

POP Marking

u 4C1/Y28.4/S/97

n USA/DOD/DEV

CERTIFICATION

Unless expressly stated to the contrary, we certify that all of the above applicable tests have been performed in strict conformance to CFR 49, Subpart M, Parts 178.600 - 178.608. Based on the successful test results shown above, this container is deemed suitable for transport of the hazardous material described herein, provided that maximum tested weights and quantities are not exceeded and the packaging is assembled as tested. The use of other packaging methods or components may make this test invalid.

PREPARED BY: Bradley J. Haas DATE: 30 July 1998
BRADLEY J. HAAS
Test Engineer

SUBMITTED BY: Jerome H. Krohn DATE: 4 Aug '98
JEROME H. KROHN
Chief, Validation Engineering Division

APPROVED BY: William F. Ernst DATE: 4 Aug 98
WILLIAM F. ERNST
Chief, Logistics Engineering Office

PART 5

HAZARD CLASSIFICATION

PERFORM: Query Next Previous Add Update Remove Table Screen ...
Searches the active database table. ** 1: jhcs table**

DOD Component I Tri-Service Coordination Y NSN 1375-00-728-5941
Nomenclature CHARGE DEMOLITION BLOCK M118 PETN DODIC M024
Inhabited Building Distance DOD Hazard Class/Division 1.1
Compatibility Group D Label (First Label) 1
Hazard Symbol Code Label (Second Label)
UN Number 0048 Label (Third Label)
Proper Shipping Name
CHARGES, DEMOLITION

Technical Name

DOT Explosive Registration Number 8805599
High Explosive Wt-lbs 2.000000 High Explosive Wt-kgs 0.907185
Net Propellant Wt-lbs 0.000000 Net Propellant Wt-kgs 0.0
Net Explosive Wt-lbs 2.000000 Net Explosive Wt-kgs 0.907185
Net Explosive QD Wt-lbs 2.000000 Net Explosive QD Wt-kgs 0.907185
PN/Dwg1 9204247 PN/Dwg2 PN/Dwg3
Remarks

Date Changed 9306 Last Action C Elements Chgd OPQ

1 row(s) found

USATCES JOINT HAZARD CLASSIFICATION SYSTEM
LIST OF DATA FROM QUERY BY NSN

Query Date - Apr 10, 1998

COM TSC -----NSN----- DODIC -----ITEM NOMENCLATURE-----

I Y 1375-00-728-5941 M024 CHARGE DEMOLITION BLOCK M118 PETN

IBD	HCD	CG	L1	L2	L3	UNS	DER	HEW-LBS	HEW-KGS	NPW-LBS	NPW-KGS
1.1	D	1				0048	8805599	2.000000	.907185	0.000000	.000000

NEW-LBS	NEW-KGS	NEWQD-LBS	NEWQD-KGS	HSC	PART-OR-DWG-NO-1	PART-OR-DWG-NO-2
2.000000	.907185	2.000000	.907185	9204247		

PART-OR-DWG-NO-3 TECHNICAL NAME

PROPER SHIPPING DESCRIPTION

CHARGES, DEMOLITION 1.1D UN 0048 PGII

SPECIAL REMARKS

END OF LIST

PART 6

PHOTOGRAPH



	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
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DAC-DEV-98-07-01. This photo shows the wirebound wooden box used in the test.

PART 7

DRAWING

LINE NO.	NAME OF PART	QTY	RECD	MATERIAL	QTY REQD	QTY ISSUED	DATE	BY	REMARKS
1	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
2	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
3	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
4	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
5	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
6	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
7	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
8	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
9	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
10	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
11	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
12	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
13	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
14	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
15	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
16	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
17	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
18	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
19	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
20	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
21	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
22	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
23	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
24	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
25	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
26	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
27	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
28	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
29	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
30	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
31	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
32	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
33	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
34	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
35	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
36	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
37	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
38	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
39	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
40	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
41	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
42	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
43	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
44	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
45	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
46	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
47	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
48	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
49	1/2" DIA. X 1/2" LONG PIN	1		STEEL					
50	1/2" DIA. X 1/2" LONG PIN	1		STEEL					

5 5/16 K 12 1/2 K 8 3/4 345126 DIMENSION 10/25
 CLEARANCE 04/11/1986 10:00 AM 1/10
 20/12/86 0.0. 17 5/10 X 13 7/10 X 8 1/2

(F A) FILLER #107
 05 JUN 68 1700 HAN X 0105 THONK

(F A) FILLER 109
 05 JUN 68 1700 HAN X 0105 THONK

PART NO.	ITEM	NSN/DODIC
6876129	CHARGE, DEMOLITION, M19	1378-00-728-5941-M024
6876126-1	CHARGE, DEMOLITION, M19B WITH TAGSANT	1375-01-399-371B-M024

TABLE 1

D	LIST OF DRAWINGS	DRAWING NUMBER	WEIGHTS (ESTIMATED)	
			NO. OF	POUNDS
1			NET	
2			USE, PLANT (UNIT)	6.6
3				
4			GRAND TOTAL (431, 432)	41.7
5			10.1142	
6			TOTAL	51.9

[illegible]

100

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[illegible]

NOTE *

1. PHOTO SYMBOL OF INTERCOMMUNICABILITY REQUIRED ON ALL BUSES
2. INSERT LAST TWO DIGITS OF YEAR PLACED.
3. MARKING SHALL BE "WITH TAGS" FOR P/N 4870128-I

MARKING INSTRUCTIONS

THE UNPOPULAR MAN IN THE

REF ID: A66700/100 SEE NOTE 2
 (c) USA7000/100

THE BOX SHALL BE MARKED IN ACCORDANCE WITH DRAWING
 DETS2222

THE PROPER SHIPPING NAME AND IDENTIFICATION NUMBER
 MARKING SHALL BE - "GASES, DETONATION UNDOH"

MARKING SHALL BE APPLIED TO TOP AND ON ONE SIDE
 OF THE PAKS.

THE DESCRIPTIVE NOMENCLATURE OF THE ITEM PAIDED
SHALL BE .

THE CURICAL DISLOCAMENT SHALL BE .42" THE ASH AND DODG SHALL BE AS SHOWN IN TABLE I
EDGAGE AND SHIPPING INFORMATION NOT MARK ON THE EXPLOSIVE HAZARDOUS QUANTITY DISTINGUISHING SHALL BE 11
THE EXPLOSIVE HAZARDOUS QUANTITY DISTINGUISHING SHALL BE 11
THE EXPLOSIVE HAZARDOUS QUANTITY DISTINGUISHING SHALL BE 11

DEVELOPMENTAL ACTIVITY CASE CODE 19800
U.S. ARMY
DEPARTMENT OF THE ARMY, DEVELOPMENT AND ENGINEERING CENTER
SIGA/TM/INT/AFSS/UL, RTM, ADJSTY OT/400-5000

9876128

MCATNEY ARMED
ORDNANCE CORPS
DEPT OF THE ARMY
DOWNTOWN NEW JERSEY

DATE	10/27/88	TIME	1425
BY	19203	BY	8876128
